



# Pediatric Emergencies and Office Preparedness

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# Objectives

1. Recognize the most common pediatric emergencies that present to primary care offices
2. Increase knowledge on the approach to common emergent pediatric complaints
3. Review essential emergency equipment and medications for the office setting
4. Understand the role of preparing the entire team in management of emergencies in the office

# An All Too Common Case

- It's a busy winter day in the clinic when a mother presents with her 6-week-old son
- Mom has him snuggled in the car carrier
- She made a sick appointment yesterday to discuss his congestion



# Case Continued

- Mom mentions he is working harder to breath today
- The receptionist completes the sign in process and sends them to the waiting area
- 10 minutes later mother rushes back up to the desk stating the baby's lips looked blue and he had a pause in breathing
  - Does the front desk staff know what to do when a truly sick patient arrives?

# Case continued

- The receptionist steps to the back and informs you about what happened
- You come to the waiting room to find the child has deep retractions, nasal flaring, and grunting
  - What equipment do you need?
  - Who knows where it is?
  - What's next?



# Case Continues

- You carry the baby to an open exam room
- You instruct the receptionist to contact 911
- Your (new to the office) nurse begins to search for the pulse oximeter, the oxygen tank, and an appropriately sized face mask



## Mask Measurement

Child Pediatric (S) : 3.2\*4.1"  
Adult Standard (M) : 3.6\*4.2"  
Adult Elongated (L) : 4\*5.2"



# Case continued

- You place him on oxygen and his sats rise from 79% to 91%
  - Can you suction him in the office?
  - Do you have the equipment for an albuterol neb?
- His fontanel is sunken and his cap refill is delayed
  - Is there IV equipment and fluids in the office?
  - Who can place that IV?

Is your office and your staff prepared?



# Pediatric Emergencies

- Emergencies happen everywhere
- Ideally, every office would have all the appropriate equipment, medication, and training
- Cost, quality, space, and scope of practice limit what is available



# Why are these emergencies in the office?

- Disease progression can be abrupt
- May be geographically closer to PCP office
- Confidence in and standing relationship with PCP

# How often does this happen?

- 73% of respondents to an AAP survey report seeing one patient a week that needs hospitalization or emergency treatment
- Another mailed questionnaire indicated >50% of pediatric offices see at least one patient a week that needs urgent treatment or hospitalization

# What types of emergencies present to the office?

- Airway emergencies
  - Bronchiolitis
  - Respiratory distress
  - Asthma
  - Croup
- Seizures
- Anaphylaxis
- Less common: Respiratory failure, Trauma, Foreign body/Airway Obstruction, Shock, Meningitis, Apnea

# Where do we fall short?

- Unprepared or underprepared staff
- Failure to stock equipment or medications
- Lack of development of protocols
- Time constraints in visits limit parent education

# Emergency Supplies

- Keeping a stock of functional, easily accessible, well-organized supplies is expensive and time intensive
- One study of 52 pediatric offices found unavailable equipment
  - Oxygen 27%
  - IV catheters 27%
  - Bag-valve masks 29%
  - IV fluids 55%

# Supplies

Item	Estimated Cost
Oxygen tank	\$14 per year
Oxygen mask/tubing	\$36/box of 50
Nebulizer Acorn	\$125/box of 50
3 mL syringes	\$4/box of 100
Bag-valve-mask	\$132
24 gauge IV catheters	\$45/box of 50
IO needles	\$90 for 5
IV tubing	\$58 for 50

Medication	Estimated Cost
Albuterol neb	\$9 for 80 doses \$1 for 30 mL saline
Normal Saline	\$1 for 2 L
Lorazepam	\$16 for 10 mg
D50 Glucose	\$2 for 200 mL
Methylprednisolone	\$7 for 400 mg
Epinephrine 1:10,000	\$6 for 20 mL

# Staff Training

- Many outpatient providers are not current in BLS and PALS/APLS
- Study of 11 pediatric practices in Pennsylvania
  - 39% of physicians were current on BLS
  - 18% of physicians were current on PALS
  - No other employee (including PA/NP/RN) in the offices were current on PALS
  - No nonmedical staff had any type of life-support training



# Mock Codes and Protocols

- Shown to promote emergency preparedness in the inpatient setting, less studied in the outpatient setting
- Study of pediatric primary care in Vermont who received teaching on airway management, IO placement, and emergency resuscitation kits
  - Written office protocols increased 67% to 83%
  - Regular check of emergency equipment increased to 97%

# Successful Mock Codes

- Involve everyone
- Practice documentation
- Try to mimic an actual emergency
- Use debriefing to identify strengths and weaknesses
- Utilize lessons learned to drive change

# Time Constraints

- Routine visits provide opportunity to prep the family for emergency situations
  - Discuss when to use the office, urgent care, and ER
  - Review when and how to access
    - EMS (911)
    - Poison control (1-800-222-1222)
    - After hours call lines
- Consider adding this information to the website

# Equipping the Office

- Access to the right equipment and medications is key
- All staff needs trained on location of emergency equipment

# MANAGING COMMON EMERGENCIES



# Croup

- Viral infection causing erythema and edema of the subglottic region
- Peak at ages 6mo-3 years typically late fall and early winter
- Caused by Parainfluenza, Adenovirus, RSV, and Influenza A
- Most cases can be treated as outpatients
- It is the most common cause of stridor in a febrile child
  - Toxic appearing and high fever, consider epiglottitis

# Treatment

- Steroids mainstay
  - Dexamethasone given by the least invasive route possible at a dose of 0.6mg/kg
- Racemic epinephrine for moderate to severe croup
  - 0.25cc in 3-5cc Normal Saline
  - May repeat q15-20 minutes
- Epinephrine 1:1,000 can also be used
  - 2mg in 5cc of NS



# Early recognition of impending respiratory failure is key

- Tired or anxious appearing
- Oxygen saturations  $<92\%$  on room air
- Increased work of breathing that does not resolve with a neb
- Observe all patients given racemic epinephrine for a minimum of two hours

# Epiglottitis

- Significantly fewer cases after advent of H. Flu vaccination
- Child appears anxious, toxic, air hungry
- Lateral neck shows thumb like projection
- ALWAYS a life-threatening emergency



# Epiglottitis

- Immediately transport to nearest ER via EMS
  - If possible call ED in advance
- If there is complete airway obstruction, begin BLS
  - Despite severe swelling, bag-valve-mask ventilation is almost always effective
- Intubation best performed in controlled condition
  - Ideally operating room with ENT and anesthesia



# Asthma

- Wheezing is caused by narrowing of the mid to small airways resulting in difficulty with exhalation.
- Inspiration “pulls” airways open by creating negative intrathoracic pressure
- Exhalation causes positive intrathoracic pressure causing collapse of the small airways
- Leads to air-trapping and dead space causing VQ mismatch and hypoxia

# Mild Exacerbation

- Treatment aimed at reversing inflammation and smooth muscle constriction
- Oxygen if hypoxic
- Albuterol: 2.5-5mg
  - If using concentrated albuterol, 0.5 ml diluted in 3-5 ml NS
- Steroids: Orapred 2mg/kg po, Solumedrol 2mg/kg IV, Decadron 1mg/kg IM

# Severe Exacerbation

- Ipratropium 250 mcg in 2.5 ml saline nebulized (increase to 500mcg in children >10 yo)
  - Atropine 0.03-0.05 mg/kg mixed with NS to a total volume of 3 ml can be used if no ipratropium
- Magnesium 75mg/kg IV up to 2g
  - Consider given with NS bolus to support BP
- Epinephrine 1:1000 IM
  - <10kg = 0.1mg
  - 11-20kg = 0.2mg
  - >20kg = 0.3mg
- Terbutaline 0.005-0.02 mg/kg subQ
- Ketamine 0.5 mg/kg IV slow push

# Asthma

- Start treatment in office.
- The earlier steroids are given, the quicker the patient will get better



- 4yo was seen yesterday for AOM. Parents gave him the first dose of antibiotics this morning. He now presents to your office in respiratory distress and with this rash which started today.



# Anaphylaxis

- An acute systemic hypersensitivity reaction characterized by multi system involvement.
  - Rash
  - Oral and Facial Swelling
  - Respiratory distress
  - GI symptoms
  - Vascular collapse

# Anaphylaxis

- Symptoms typically present within 15 minutes of exposure to antigen
- Older children may express uneasiness prior to onset
- Itching/swelling of throat and tongue
- Rash
- Edema to lips
- Wheezing
- Vomiting or Diarrhea

# Anaphylaxis

- Treatment aimed at blocking histamine.
  - H1 and H2 blocker
    - Benadryl 1 mg/kg IV Q6h (can be given IM)
    - Pepcid 0.5-1 mg/kg/day divided IV BID
  - Steroids
    - Orapred 2 mg/kg po
    - Solumedrol 1-2 mg/kg IV
    - Decadron 1 mg/kg PO/IV/IM
  - Epinephrine 1:1000
    - 0.01mg/kg IM, Max dose 0.3mg

# Anaphylaxis

- Severe cases treat with Epinephrine immediately.
- If hypotensive, begin fluid resuscitation with Normal Saline 20 mg/kg (max 1L)
  - Repeat up to 3 times
- Add albuterol for wheezing patients.
  - Albuterol 5 mg inhaled Q5-10 minutes

- You've just completed a patient's 2 year WCC and his bravery was rewarded with a trip to the office treasure box
- He chooses the super bounce ball
- While his mom is checking out, he begins flailing his arms and looks panicked, but is not able to speak



# Upper Airway Obstruction- Foreign Body

- Over 1 year of age + Conscious
  - Heimlich maneuver is recommended
  - Can be performed standing or sitting
  - If 5 thrusts performed without expelling object, given 3-4 rescue breaths

WebMD

## HOW TO DO THE HEIMLICH MANEUVER

Do the Heimlich if the choking person:  
• Can't speak or cough • Is conscious • Is over 1 year old

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1 Put the thumb side of your fist slightly above the person's bellybutton.
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2 Hold your fist tight with your other hand.
- 

3 Quickly thrust upward and inward into the person's belly.
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4 Repeat several times until the choking object comes loose.

IF IT DOESN'T DISLodge OR THE PERSON FAINTS, DO CPR UNTIL 911 HELP ARRIVES.

Sources: National Safety Council, University of Maryland Medical Center.

# Upper Airway Obstruction

- Over 1 year of age + Unconscious
  - Supine abdominal thrust recommended
  - Open airway with a jaw thrust
  - Place hands above the navel, below xyphoid process
  - Midline thrusts toward the head
  - Check mouth after 5 thrusts
  - If not clear, give 3-4 rescue breaths





# Upper Airway Obstruction

- Under 1 year Back blows followed by chest thrusts
  - Hold supine on forearm while firmly holding the jaw to support the head
  - Deliver 5 back blows
  - Flip the infant keeping the head lower than trunk
  - Give 5 chest thrusts one finger's width below the nipple line
  - Check mouth
  - If still obstructed give 3-4 rescue breaths

Place the infant stomach-down across your forearm and give five quick, forceful blows on the infant's back with heel of your hand



ADAM.

- You are stepping into the hallway after the last well child check when you hear a parent screaming for help
- You run to the room to find her toddler lying on the floor with tonic clonic movement



# Seizures

- Most Common Causes
  - Fever (ages 6 months to 6 years)
  - Idiopathic (approximately 25%)
  - Head trauma
    - Increased ICP
    - Intracranial hemorrhage
  - Electrolyte abnormalities
  - Infection
    - Encephalitis more common than bacterial meningitis

# Simple Febrile Seizures

1. Fever ( $>100.4$ )
2. Age 5 mo to 6 y
3. Last  $<15$  min
4. No recurrence in  $<24$ h
5. Generalized seizure

# Febrile Seizure

- 5% of all kids get them
- Tend to run in families
- Excellent prognosis
- Generally no intervention or workup needed if returned to neuro baseline
- 10-30% will have another during childhood
- Risk of seizure disorder goes from 1% to 2%

# Complex Febrile Seizure

- Longer (>15min)  
*OR*
- Focal  
*OR*
- Recur within 24h

# Status Epilepticus

- Continuous seizure activity or intermittent seizure activity without return to baseline between seizures, lasting greater than 30 minutes.
- Goals of Therapy
  - Prevent complications from prolonged seizure.
  - Identify cause and treat
  - Prevent side effects from treatment (respiratory failure, hypotension, etc.)

# Seizure management

- Check ABC's
  - Airway repositioning and oxygen very important
- Check a glucose
  - Easily treatable and should not be missed.
- Look for causes
  - Check electrolytes if able
  - Signs of trauma
  - Recent illness/fever



# Seizure management

- For seizure activity lasting greater than 5 minutes begin pharmacologic treatment.
  - Benzodiazepines are first line
    - Ativan 0.1mg/kg IV/IM
    - May give Valium 0.1mg/kg IV but has more respiratory depression
    - If unable to obtain IV may give rectal valium 0.5mg/kg up to 20mg
  - Benzodiazepines can be repeated typically Q5 minutes x 3
    - With subsequent doses, there is increased risk of respiratory depression

# Seizure management

- Second line medications
  - Fosphenytoin 20 PE/kg
  - Keppra 20 mg/kg
  - Phenobarbital 20 mg/kg
  - Pentobarbital 10-15 mg/kg load, then 1 mg/kg/hr
- Hypoglycemia generally <60 mg/dL
  - D10 2-4 ml/kg in children <8 years
  - D25 1 ml/kg in older children
  - D50 50 ml in adult patients

# Diabetic Ketoacidosis

- Ketoacidosis results from breakdown of fat for fuel
- Osmotic diuresis leads to hypovolemia and lactic acidosis
- Goals of therapy
  - Replace fluid deficits
  - Correct hyperglycemia and hyperosmolarity
  - Maintain normal range for electrolytes
  - Correct ketoacidosis

# DKA

- Assess for increased ICP
  - Rapid fluid replacement can cause cerebral edema
- Expected electrolyte abnormalities
  - Hyponatremia
  - Hyperkalemia initially
    - Correction unmasks whole body hypokalemia
  - Hypophosphatemia typically not clinically a problem

# DKA

- Manage ABCs
  - Contact EMS if AMS or concern for increased ICP
- Recommended labs
  - Accucheck, Urine dip, Serum electrolytes, VBG
- Controlled volume expansion
  - NS bolus 10 ml/kg over 30-60 minutes
  - Circulatory failure is rare
- Insulin 0.1 units/kg/hr if transport is delayed
  - No insulin is necessary in the first 1-2 hours after the initial fluid bolus
  - Insulin bolus (0.1 unit/kg) only if no access to infusion

# DKA

- Continued volume expansion over 24-48 hours after diagnosis
  - NS at 1.5-2 x maintenance
  - Potassium added only after serum level available
    - Typically added when potassium falls below 5
  - Dextrose added when serum glucose falls less than 250-300
    - Hyperglycemia corrects faster than acidosis
    - Goal is to decrease glucose by 50-100 per hours

# References

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